Mark each point independently. Accept alternative correct responses. Underlined words are required. [1] per bullet point unless stated. ★ = Higher Tier only.

Question 1 [0 marks]

Context: Ten quadrats were placed at random positions in the field. The number of daisies in each quadrat was...

Q: A student uses quadrats to estimate the population of daisies in a 30 m × 20 m school field. Each quadrat is 1 m². The t...

[0 marks]

Question 2 [2 marks]

Q: Calculate the mean number of daisies per quadrat. Show your working.

- Total = 12+8+15+6+10+14+9+11+13+7 = 105 [1]
- Mean = 105 / 10 = 10.5 daisies per quadrat [1]

[2 marks]

Question 3 [3 marks]

Q: Use your answer to estimate the total number of daisies in the whole field. Show your working.

- Total area of field = 30 × 20 = 600 m² [1]
- Number of quadrats that would fit = 600 / 1 = 600 [1]
- Estimated population = 10.5 × 600 = 6300 daisies [1]

Note: Accept any calculation following on from the student's own mean, even if incorrect, provided method is correct.

[3 marks]

Question 4 [2 marks]

Q: Explain why the student should use random sampling rather than choosing where to place the quadrats.

- Random sampling prevents bias — the student might (unconsciously or deliberately) choose areas with more or fewer daisies [1]
- Random sampling ensures every part of the field has an equal chance of being sampled — results are more representative [1]

[2 marks]

Question 5 [3 marks]

Q: Describe ONE way the student could use a transect to investigate how the distribution of daisies changes across the scho...

- Place a tape measure across the field from one side to the other [1]
- Place quadrats at regular intervals along the tape (e.g. every 2 metres) [1]
- Count the number of daisies in each quadrat and record the position — this shows how distribution changes along the transect [1]

[3 marks]

Question 6 [2 marks]

Q: The student also measures the light intensity at each quadrat position. Explain why measuring abiotic factors is importa...

- Abiotic factors such as light intensity affect where organisms can live [1]
- By measuring abiotic factors the student can explain WHY the distribution of daisies varies — for example daisies need light for photosynthesis so may be fewer under trees [1]

[2 marks]

Question 7 ★ Higher Tier [2 marks]

Q: A second student repeats the investigation using 20 quadrats instead of 10. Explain how this affects the reliability of ...

• Using more quadrats gives a more representative sample of the whole field [1]

• The mean will be more reliable / less affected by anomalous individual quadrats — the population estimate will be more accurate [1]

[2 marks]

END OF QUESTIONS — Total: 14 marks